The Columbia Glacier

Lorin Mannella

Sierra Club Bulletin, Vol. 64, No. 3, 1979.

The Columbia Glacier

ORIN MANNELLA

upertanker traffic from Valdez, Alaska, e terminus of the transAlaska pipeline, ay encounter a serious new hazard— iant icebergs in the shipping lanes. fter years of stability, the face of the olumbia Glacier, an ice river that flows nto Columbia Bay only nine miles from aldez, appears to be receding and may oon start "calving"—shedding huge cebergs that will become navigational azards as they float into the path of the upertankers that deliver Alaska's oil to alifornia.

The Columbia Glacier is a 41-mile- ong river of ice that wends its way hrough the rugged Chugach Mountains f southeastern Alaska to the frigid wa- ers of Columbia Bay in Prince William ound. Because it ends at the sea, it is alled a tidewater glacier. One of the argest and most beautiful glaciers along he Alaska coast, it attracts thousands of ourists every year who ride the ferry of he Alaska Marine Highway System be- ween Valdez and Whittier to approach within a half-mile of the glacier's im- mense face. Private sightseeing boats venture even closer, gently pushing their way through the ice-clogged waters.

Unlike other glaciers in the area that eceded significantly, the Columbia has remained stable since it was mapped by the Vancouver expedition's cartographer, Whidbey, in 1794.

The cliff face or terminus of the glacier at Columbia Bay varies in height from to 262 feet above sea level. The face, two and a half miles long, juts far into Prince William Sound to form the end of the bay; the glacier also extends another two and a half miles east from Heather Island, across another smaller bay and then up onto the land. The huge mass of ice covers a total surface area of 440 square miles. So impressed by its size were two National Geographic Society scientists in 1914 that their study of the glacier includes a map of the ice with a map of the city of Washington, D.C., superimposed.

As one approaches Columbia Bay by boat, small icebergs begin to appear. Seen from miles away, the wall of ice looks out of place, as though it had been carelessly dropped between the rugged, bristling forests that flank it on both sides. As the boat approaches the ice cliff, the icebergs become more numerous, and although the temperature on land may be in the 60s or 70s, the air directly in front of the glacier is so cold that bare hands clutching cameras are quickly numbed. Looking up at the craggy wall of ice, the viewer forgets the green-forested islands, mountains and shoreline of Prince William Sound and soon the dominant impression is of ice—nothing but ice in every direction.

Although the waters of Columbia Bay are frigid and clogged with ice for almost a mile from the cliff face—even during the summer—the area teems with life. Plankton and microscopic water plants thrive in the icy water and attract a large variety of sea animals in great numbers. Feeding fish attract kittiwakes, bal eagles and harbor seals to Prince Willia Sound, and killer and Minke whales an harbor and Dall porpoises are not un common. Even the larger humpbac whale, an endangered species, is occa sionally seen, as are the grey whale an members of the beaked whale famil Harbor seals often congregate on the ic floes in front of the glacier to feed on th bay's plentiful fish and crustaceans.

The glacier itself originates in basi high in the Chugach Mountains, where is fed by year-round snowfall. Th icefields fill with snow, and gravi forces them downward, out of the basin separate streams converge in the mai body of the glacier, which carves a valle through the land to the sea. The low twelve miles of this sloping ice river a visible from Columbia Bay.

Seen close, the glacier is striking. I intense blue color is caused by refracti of light from the highly compacted i crystals. The intensity of the color vari with the amount of sunlight; the col is more vivid on cloudy days. The fa of the cliff has a horizontally stripe layered appearance. Each winter a lay of compacted, granular snow, called firn, is added to the glacier. Each su mer a film of dust, rock, pollen spore insects and bits of vegetation is deposit on top of the newest firn. ing layers record the cl and, under a microscope the biological history of

The sides of the glacie the forest, are littere twisted and upturned gravel imbedded in the glacier and offer eviden gouging, centuries lon from the mountains to

Until recently, sci the stability of the glac immense size. Photogr Harriman Alaskan Ex vealed that the glacier h the same position si fourteen-member U.S vey team studying th

Rec'd: July 9 /80
Order No.:
Price: Pam. Serv.
42366

Pam:551.324.2:(*49) MAN

POLAR
PAM
1899

POLARPAM

The Columbia Glacier

LORIN MANNELLA

Supertanker traffic from Valdez, Alaska, the terminus of the transAlaska pipeline, may encounter a serious new hazard—giant icebergs in the shipping lanes. After years of stability, the face of the Columbia Glacier, an ice river that flows into Columbia Bay only nine miles from Valdez, appears to be receding and may soon start "calving"—shedding huge icebergs that will become navigational hazards as they float into the path of the supertankers that deliver Alaska's oil to California.

The Columbia Glacier is a 41-mile-long river of ice that wends its way through the rugged Chugach Mountains of southeastern Alaska to the frigid waters of Columbia Bay in Prince William Sound. Because it ends at the sea, it is called a tidewater glacier. One of the largest and most beautiful glaciers along the Alaska coast, it attracts thousands of tourists every year who ride the ferry of the Alaska Marine Highway System between Valdez and Whittier to approach within a half-mile of the glacier's immense face. Private sightseeing boats venture even closer, gently pushing their way through the ice-clogged waters.

Unlike other glaciers in the area that have receded significantly, the Columbia Glacier has remained stable since it was first mapped by the Vancouver expedition's cartographer, Whidbey, in 1794.

The cliff face or terminus of the glacier at Columbia Bay varies in height from 164 to 262 feet above sea level. The face, two and a half miles long, juts far into Prince William Sound to form the end of the bay; the glacier also extends another two and a half miles east from Heather Island, across another smaller bay and then up onto the land. The huge mass of ice covers a total surface area of 440 square miles. So impressed by its size were two National Geographic Society scientists in 1914 that their study of the glacier includes a map of the ice with a map of the city of Washington, D.C., superimposed.

As one approaches Columbia Bay by boat, small icebergs begin to appear. Seen from miles away, the wall of ice looks out of place, as though it had been carelessly dropped between the rugged, bristling forests that flank it on both sides. As the boat approaches the ice cliff, the icebergs become more numerous, and although the temperature on land may be in the 60s or 70s, the air directly in front of the glacier is so cold that bare hands clutching cameras are quickly numbed. Looking up at the craggy wall of ice, the viewer forgets the green-forested islands, mountains and shoreline of Prince William Sound and soon the dominant impression is of ice—nothing but ice in every direction.

Although the waters of Columbia Bay are frigid and clogged with ice for almost a mile from the cliff face—even during the summer—the area teems with life. Plankton and microscopic water plants thrive in the icy water and attract a large variety of sea animals in great numbers. Feeding fish attract kittiwakes, bald eagles and harbor seals to Prince William Sound, and killer and Minke whales and harbor and Dall porpoises are not uncommon. Even the larger humpback whale, an endangered species, is occasionally seen, as are the grey whale and members of the beaked whale family. Harbor seals often congregate on the ice floes in front of the glacier to feed on the bay's plentiful fish and crustaceans.

The glacier itself originates in basins high in the Chugach Mountains, where it is fed by year-round snowfall. The icefields fill with snow, and gravity forces them downward, out of the basins; separate streams converge in the main body of the glacier, which carves a valley through the land to the sea. The lower twelve miles of this sloping ice river are visible from Columbia Bay.

Seen close, the glacier is striking. Its intense blue color is caused by refraction of light from the highly compacted ice crystals. The intensity of the color varies with the amount of sunlight; the color is more vivid on cloudy days. The face of the cliff has a horizontally striped, layered appearance. Each winter a layer of compacted, granular snow, called a firn, is added to the glacier. Each summer a film of dust, rock, pollen spores, insects and bits of vegetation is deposited on top of the newest firn. These alternating layers record the climatic changes and, under a microscope, reveal part of the biological history of the area.

The sides of the glacier, where it meets the forest, are littered with broken, twisted and upturned trees. Tons of gravel imbedded in the ice blacken the glacier and offer evidence of the earth-gouging, centuries-long trip it has taken from the mountains to the sea.

Until recently, scientists have noted the stability of the glacier in relation to its immense size. Photographs taken by the Harriman Alaskan Expedition in 1899 reveal that the glacier has occupied about the same position since then. But a fourteen-member U.S. Geological Survey team studying the glacier under a

Rec'd: July 7/80
Order No.:
Price: ILL-Xerox
Acc No: Red Deer Community College
42366

two-year, $1.3-million project has reported that as early as this summer the face may start retreating and tossing thousands of various-sized icebergs into the paths of the 200,000-ton supertankers that ship oil south from Valdez.

Harald Sund

An aerial view of the Columbia Glacier. The semicircular embayment in its face may start increased "calving" of icebergs this summer.

Austin Post, a hydrologist with the research group, reported that in 1971 the glacier had developed a large opening, or embayment, on its west side that it has since been unable to repair. The glacier had previously been stable because its face rested on a shoal only a few feet below the water's surface. But a tidewater glacier becomes unstable when it retreats even a short distance from a terminal shoal into a deep basin, where the glacier loses its support and begins to erode. This could easily happen to the Columbia.

Post now says, "There's about a 50-50 chance it will begin shrinking this summer or in the next few years. This instability has been building for decades." He also says that if the face of the glacier does begin to shrink, it could rapidly increase iceberg calving by as much as 50% of its normal production.

Another group of federal scientists has proposed a number of strategies for keeping icebergs away from the supertankers. One suggestion is to stretch a ten-inch-thick rope across Columbia Bay to corral passing icebergs and hold them until they melt. The rope would have to be two and a half miles long and would cost about $32 million.

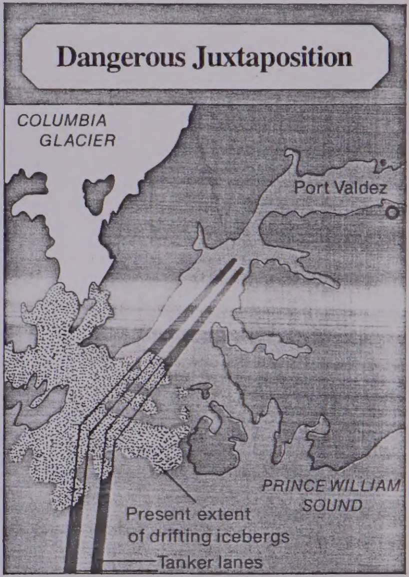
Another proposal is to lasso the icebergs and, using a flotilla of tugboats, haul them out of the way. A third proposal is to keep the supertankers away from the icebergs—by shutting down the oil tanker traffic until the icebergs float away. In August 1977 the U.S. Coast Guard, which has jurisdiction over the Alaskan oil-shipping lanes, did close down the Valdez Arm shipping lanes to night traffic because of icebergs.

More Earthquakes?

A large earthquake struck the Alaska coast on February 28, and more may be on the way, according to a report in *Science* (March 16, 1979). The quake was centered 400 kilometers east of Anchorage—very near Valdez and the Columbia Glacier—in a normally active seismic zone that has not experienced a large earthquake in 30 years or more. William McCann, of Lamont-Doherty Geological Observatory, believes that the earthquake relieved some of the seismic stress in the area—but not all of it. Thus, McCann is convinced there is a strong possibility of other quakes near Valdez and the Columbia Glacier in the near future. The effect of earthquakes on the glacier's stability may be a matter of considerable consequence.

The final suggestion is to locate the icebergs by radar. This would involve constructing a radar station near the Valdez Arm shipping lanes. Avoiding the icebergs once they're located is another problem.

It should be recalled that some of the environmental objections to building the transAlaska pipeline with a terminal in Valdez were: the lack of maneuverability of the supertankers, especially in the narrower sections of Valdez Arm; the frequency of storms, high waves, winds and fog along the supertanker routes; and the likelihood of earthquakes in the Prince William Sound area. When the threat of massive icebergs floating about is added to the present dangers, the possibility of collisions and oil spills with potentially devastating results for marine life is greatly magnified. Austin Post believes that unless the glacier can repair the embayment in its west side and maintain its present position, it will begin a retreat of "many kilometers per year as innumerable icebergs, some of immense size, break away from the glacier." How large would these icebergs be?



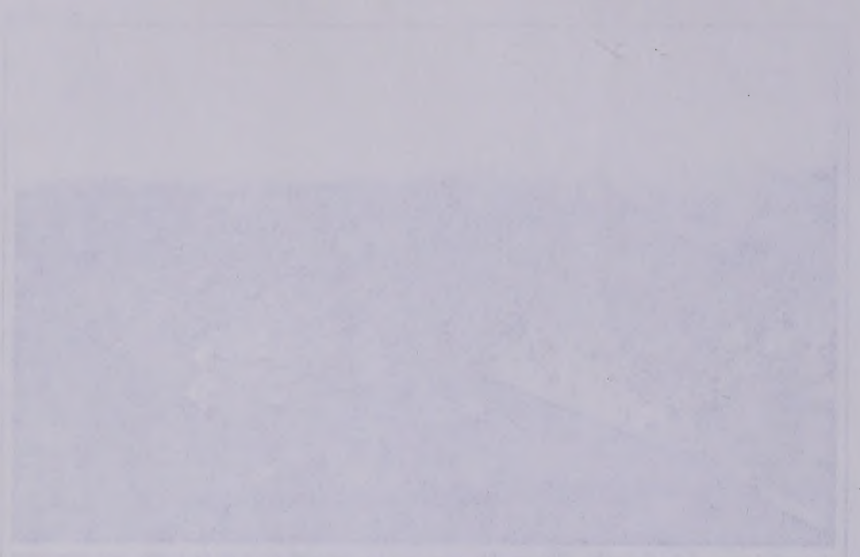
Dangerous Juxtaposition

A cube-shaped iceberg with sides one quarter-mile long would weigh more than a billion tons—5000 times heavier than a supertanker. The feasibility of roping off and containing an iceberg propelled by wind and waves must, therefore, remain seriously in doubt.

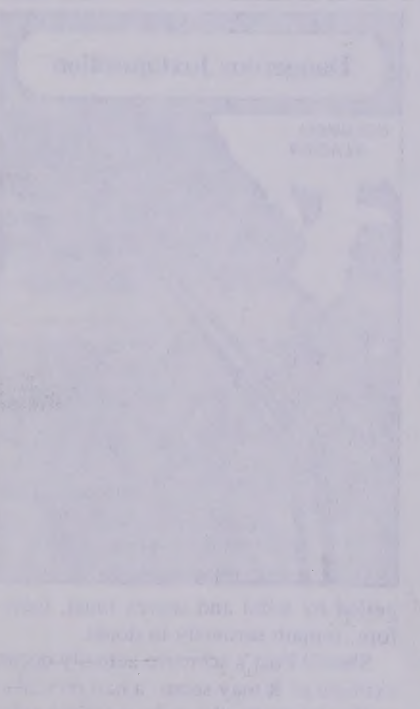
Should Post's scenario actually occur, extreme as it may seem, a ban on tanker traffic might be the only practical solution until the icebergs and the threat of collision disappeared. Since this would undoubtedly take years, the suggestion would undoubtedly be vehemently opposed by oil companies and the politicians who represent them.

One final note of irony: For years, passengers aboard the ferryboat *M.V. Bartlett*, when making a regular sightseeing stop at the face of Columbia Glacier, have been allowed to take turns sounding the ship's horn, which is loud enough to dislodge chunks of ice the size of houses that fall into the sea with a roar. □

Lorin Mannella is a free-lance writer in Medford, Massachusetts.



An aerial view of the Columbia Glacier. [illegible] "calving" of icebergs [illegible]



[illegible] the paths of the 200 100,000-ton supertankers that ship oil south from Valdez.

Austin Post, a hydrologist with the research group, reported that in 1977 the glacier had developed a large opening, or embayment, on its west side that it has since been unable to repair. The glacier had previously been stable because its face rested on a shoal only a few feet below the water's surface. But a tidewater glacier becomes unstable when it retreats even a short distance from a terminal shoal into a deep basin, where the glacier loses its support and begins to erode. This could easily happen to the Columbia.

Post now says, "There's about a 50-50 chance it will begin shrinking this summer or in the next few years. The instability has been building for decades." He also says that if the face of the glacier does begin to shrink, it could rapidly increase iceberg calving by as much as 50% of its normal production.

Another group of federal scientists has proposed a number of strategies for keeping icebergs away from the supertankers. One suggestion is to stretch a ten-inch-thick rope across Columbia Bay to corral passing icebergs and hold them until they melt. The rope would have to be two and a half miles long and would cost about $82 million.

Another proposal is to lasso the icebergs and, using a fleet of tugboats, haul them out of the way. A third proposal is to keep the supertankers away from the icebergs—by shutting down the oil tanker traffic until the icebergs float away. In August 1977 the U.S. Coast Guard, which has jurisdiction over the Alaskan oil-shipping lanes, did close down the Valdez Arm shipping lanes to night traffic because of icebergs.

The final suggestion is to locate the icebergs by radar. This would involve constructing a radar station near the Valdez Arm shipping lanes. Avoiding the icebergs once they're located is another problem.

It should be recalled that some of the environmental objections to building the transAlaska pipeline with a terminal in Valdez were: the lack of maneuverability of the supertankers, especially in the narrower sections of Valdez Arm; the frequency of storms, high waves, winds and fog along the supertanker routes; and the likelihood of earthquakes in the Prince William Sound area. When the threat of massive icebergs floating about is added to the present dangers, the possibility of collisions and oil spills with potentially devastating results for marine life is greatly magnified. Austin Post believes that unless the glacier can repair the embayment on its west side and maintain its present position, it will begin a retreat of "many kilometers per year as innumerable icebergs, some of immense size, break away from the glacier." How large would these icebergs be?

A cube-shaped iceberg with sides one quarter-mile long would weigh more than a million tons—much more than the largest supertanker. The [illegible] of [illegible] oil and containers [illegible] pro-pelled by wind and severe tides, therefore, remain seriously in doubt.

Should Post's scenario actually occur, extreme as it may seem, a halt to tanker traffic might be the only practical solution until the icebergs and the threat of collisions disappeared. Since this would undoubtedly take years, the suggestion would undoubtedly be vehemently opposed by oil companies and the politicians who represent them.

One final note of irony. For years, passengers aboard the luxury liner, [illegible], which making a regular summer stop at the face of Columbia Glacier, have been allowed to take turns sounding the ship's horn, which is loud enough to [illegible] the size of [illegible] that fall into the sea with a roar.

[illegible] is a freelance writer in [illegible], New Mexico.

More Earthquakes?

A large earthquake struck the Alaska coast on February 28, and more may be on the way, according to a report in *Science* (March 16, 1979). The quake was centered 400 kilometers east of Anchorage—very near Valdez and the Columbia Glacier—in a normally active seismic zone that has not experienced a large earthquake in 30 years or more. William McCann, of Lamont-Doherty Geological Observatory, believes that the earthquake relieved some of the seismic stress in the area—but not all of it. Thus, McCann is convinced there is a strong possibility of other quakes near Valdez and the Columbia Glacier in the near future. The effect of earthquakes on the glacier's stability may be a matter of considerable consequence.

Date Due

42366 Pam:551.324.2:(*49)
MAN

MANNELLA, Lorin.
AUTHOR

The Columbia Glacier.
TITLE

Sierra Club Bulletin, Vol. 64, No.3
1979

DATE LOANED	BORROWER'S NAME	DATE DUE

42366

BOREAL INSTITUTE FOR NORTHERN STUDIES, LIBRARY
THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA T6G 2E9
CANADA

University of Alberta Library
0 1620 0332 4769